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## RESEARCH ARTICLE

# Empathising and Systemising in Adolescents with Gender Dysphoria

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**Background:** Recent studies have highlighted the co-occurrence of gender dysphoria (GD) in adolescence and Autistic Spectrum Conditions (ASC). Systemising and empathising are two psychological dimensions linked to ASC. People with ASC score below average on the Empathy Quotient (EQ) and average or above average on the Systemising Quotient (SQ). Based on the results of previous studies we predicted that if the young people with GD shared aspects of the 'broader autism phenotype', their EQ would be lower, and their SQ would be the same or higher, compared to controls of their natal gender.

**Methods:** This preliminary study examined systemising and empathising in adolescents with GD using parent report questionnaires. 35 parents of adolescents with GD aged 12-18 attending the Gender Identity Development Service (London) took part. Parents of 156 typically developing adolescents aged 12-18 were used as a control group. The parents were asked to complete the Adolescent EQ and SQ.

**Results:** The mean EQ score of both the female-to-male, and male-to-female GD group was found to be significantly lower than typically developing females, but similar to that of control males. There was no significant difference on the SQ between the gender dysphoric groups and either female or male controls.

**Conclusion:** This study shows that on average adolescents with GD, specifically those who are female-to-male, have lower empathy than controls. For this group of adolescents it may be helpful to offer psychological interventions that improve their communication skills and their ability to take on board other people's views, to support their development. This may enable them to make better informed decisions regarding treatment and physical intervention options during adolescence and beyond.

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Recent studies have highlighted the co-occurrence of gender dysphoria (GD) in adolescence and Autism Spectrum Conditions (ASC). De Vries, Noens, Cohen-Kettenis, van Berckelaer-Onnes and Doreleijers (2010), at the Amsterdam Gender Identity Clinic, reported the occurrence of ASC in 7.8% of children and adolescents with GD, which is significantly higher than the general population rate of ASC of 1% (Baird et al. 2006; Baron-Cohen et al 2009). Additionally, in previous studies of adults, Robinow (2009) reported an over representation of Asperger Syndrome (AS) among transgender people and Jones et al. (2011) reported elevated scores on the Autism Spectrum Quotient (AQ) in female-to-male transsexual people (transmen). There are also case reports describing the co-occurrence of GD and ASC (Gallucci, Hackerman & Schmidt 2005; Landén & Rasmussen 1997; Mukaddes 2002; Tateno 2008; Williams, Allard & Sears 1996). The significance of these findings in terms of the development of the gender dysphoria and its persistence or desistance is unclear.

Systemising and empathising are two psychological dimensions that have been linked to ASC. Empathy tends to be lower in people with ASC, whereas systemising tends to be average or above average (Baron-Cohen 2009). Empathy involves what has been called mindreading, that is the ability to identify another person's emotions and thoughts (cognitive empathy). It also involves the ability to respond to another person's thoughts and feelings with an appropriate emotional reaction (affective empathy) (Baron-Cohen 2008). Systemising is defined as the drive to analyse or construct a system. A system is governed by rules, from which one can predict its functioning (Baron-Cohen 2008).

Empathy and systemising show typical sex differences on average in the general population: females tend to score higher on empathising and males higher on systemising, both in adulthood (Baron-Cohen & Wheelwright 2004; Baron-Cohen 2002) and in adolescence (Auyeung, Allison, Wheelwright & Baron-Cohen 2012). Given the link between

gender and these two psychological dimensions, the present study set out to examine systemising and empathising in adolescents with atypical gender identity development, also known as Gender Dysphoria, compared with typical adolescents of the same age.

GD in young people is a complex and rare condition where there is an incongruence between the young person's perceived gender identity and their natal gender. The diagnostic criteria for gender dysphoria in adolescents and adults are defined in DSM-V. This includes the expression of an experienced gender that is in contrast to the gender assigned at birth, the conviction that one has the typical feelings and reactions of the other gender, a strong desire to get rid of one's primary and secondary sex characteristics and acquire those of the other gender, as well as a strong desire to be of the other gender and to be treated as the other gender or some alternative gender different from the gender assigned at birth (American Psychiatric Association 2013). It is important to evaluate what contribution variations in empathising and systemising make to the development of gender dysphoria during childhood and adolescence.

The Systemising Quotient (SQ) and Empathy Quotient (EQ) were devised to measure the two dimensions of systemising and empathising. As well as the reported sexual dimorphism on these scales (males on average score higher on SQ while females on average score higher on EQ), people with ASC score below average on EQ and average or above average on SQ, compared to controls. Therefore, it is the discrepancy between the EQ and SQ that determines the likelihood of having an ASC (Baron-Cohen 2009). As males tend to score lower on empathy and higher on systemising and since these trends are mirrored in people with autism spectrum conditions, ASC has been conceptualized as an extreme of the male brain (Baron-Cohen 2002).

The extreme male brain theory of ASC is based on the empathising and systemising theory in which these two dimensions are

used to characterise individual differences in the population and between the two genders. As adolescents with GD identify with the other gender and since previous studies have shown that there is an over-representation of people with ASC in this group, we tested whether the patterns in empathising and systemising, associated with the two genders, are seen in this population in line with the gender with which the adolescents identified, rather than their natal gender. In addition we tested whether this pattern applies to both female-to-male and male-to-female gender dysphoric adolescents.

Studies in non-human mammals have identified a clear link between exposure to hormones, such as testosterone, during critical periods for sexual differentiation of the brain, and sex-typical behavior in later life (Hines 2004). In humans, levels of foetal testosterone measured from amniotic fluid predict scores on the EQ and SQ (Auyeung et al. 2006; Chapman et al. 2006), as well as measures of autistic traits (Auyeung et al. 2009). These studies suggest that there is a biological contribution to the levels of systemising and empathising and, therefore, that psychological functioning is influenced by the way in which the brain is shaped by hormones, not just by post-natal social influences.

Based on the results of previous studies of ASC and GD, we predicted that if the young people shared aspects of the 'broader autism phenotype' (i.e. mild features of autism) (Baron-Cohen 2008), their empathising would be lower, and their systemising would be the same or higher compared to controls of their natal gender. There has been limited research into the co-occurrence of GD and ASC in young people, and this research has used diagnostic categories showing an over-representation of ASC in young people with GD. This clinical approach can exclude people who do not fulfil the diagnostic criteria for ASC. The current research can capture trends and differences between the gender dysphoric group and controls that may be overlooked by a diagnostic approach to ASC. To our knowledge no previous research

has studied empathising and systemising in adolescents with gender dysphoria. The awareness of the differences in empathising and systemising relative to controls may influence and inform clinicians' approaches to therapy with young people with GD (Di Ceglie 2013).

This is a preliminary study that explored the value of research into empathising and systemising in young people with GD.

## Method

### *Participants*

191 parents of adolescents (age 12–18) were included in the study. This included a gender dysphoric group and a control group. 35 parents of adolescents (mean age = 15.74, SD = 1.72) attending the Gender Identity Development Service (GIDS) in the Tavistock Centre in London (gender dysphoric group) took part in the study, out of which 60% ( $n = 21$ ) of the adolescents were natal females. These adolescents fulfilled the criteria for Gender identity Disorder (now called gender dysphoria) according to DSM-IV, and had attended the service for varying amounts of time. At the time of the study, the DSM-V criteria for gender dysphoria had not yet been published. Participants were not excluded on the basis of associated psychological difficulties. Parents of adolescents aged 12–18 years with gender dysphoria attending the GIDS were contacted by letter, explaining the study. The letter included the SQ, EQ and a consent form.

The control group consisted of 156 parents of adolescents between the ages of 12–18 (mean age = 15.47, SD = 1.48, 53.2% female) recruited from the general population via the Cambridge University research website ([www.cambridgepsychology.com](http://www.cambridgepsychology.com)). The questionnaires were completed online.

The difference in sample sizes between the gender dysphoric group and control group are due to the fact that gender dysphoria is a rare condition. Statistically, this may have influenced the results, to which we return in the discussion. The participants volunteered to take part in the study and received no

monetary incentive. The research received ethical approval from the National Research Ethics Service (NRES) Committee London-Camden and Islington.

### **Design**

We employed a 2x2 between subjects design, with the two independent variables being natal gender (male or female) and group (gender dysphoric or control) and the dependent variable being total empathising or systemising score.

### **Materials**

All participants completed both the Empathy Quotient (EQ) and the Systemising Quotient (SQ) – Adolescent versions (Auyeung et al., 2012). Parents were asked to indicate how strongly they agreed with each statement about their child by ticking one of four options: 'definitely agree', 'slightly agree', 'slightly disagree', or 'definitely disagree'. Each of the items scores 1 point if the respondent records the behaviour mildly or 2 points if the respondent records the behaviour strongly. The EQ has a total of 40 items, with a maximum score of 80. The SQ has 55 questions, with a maximum score of 110.

### **Results**

Z-scores were calculated to check for outliers. Less than 5% had absolute values greater than 1.96 and none were greater than 3.29 and so no cases had to be removed (Field 2005).

Mean SQ and EQ are given in Table 1. There was no significant correlation between SQ and EQ scores when all groups were examined ( $r = -0.04$ ,  $p = 0.31$ ). Nor was there a significant correlation between these two measures when looking at natal females ( $r = 0.02$ ,  $p = 0.43$ ) and natal males separately ( $r = -0.03$ ,  $p = 0.39$ ), or the transgender ( $r = -0.08$ ,  $p = 0.32$ ) and control groups separately ( $r = -0.04$ ,  $p = 0.33$ ).

### **Psychological dimension empathising**

A between-group ANOVA was run with empathising as the dependent variable, and with group (control or gender dysphoric) and

natal gender (female or male) as independent variables. There was a significant main effect of group ( $F(1,187) = 14.78$ ,  $p < 0.001$ ), indicating that mean EQ scores were significantly different in the control group and the gender dysphoric group. There was also a significant main effect of gender ( $F(1,187) = 6.75$ ,  $p < 0.05$ ), indicating that the means on the EQ questionnaire were significantly different for natal females and natal males. There was no significant interaction between group and gender ( $F(1,187) = 0.21$ ,  $p = 0.64$ ).

Since this is the first study of its kind, we were interested in looking at all comparisons between the different groups, despite there being no significant interaction between group and gender.

### **Psychological dimension empathising: post hoc tests**

Pairwise multiple comparisons using Tukey's Honestly Significant Difference (HSD) to correct for experiment-wise error rates were performed. We used Tukey's HSD as it controls for Type 1 errors very well (see Field 2005). The mean EQ score for natal females in the gender dysphoric group was significantly lower than for females in the control group ( $p < 0.01$ ). No significant difference was found between the female-to-male gender dysphoric group and the male controls ( $p = 0.36$ ), showing that the natal female adolescents, who identify as males, have similar EQ scores to male controls. There was no significant difference between the mean EQ scores for the natal males and natal females in the gender dysphoric group ( $p = 0.91$ ). However, in the control group, the mean empathising score was marginally lower for males than for females ( $p = 0.056$ , trend towards significance). In the male-to-female gender dysphoric group, the mean EQ score was lower than in the male control group, although this did not reach statistical significance when using Tukey's (HSD) correction ( $p = 0.13$ ). The mean EQ scores were however significantly lower for the male-to-female gender dysphoric group than the female controls ( $p < 0.01$ ).

	EQ			SQ		
	Gender dysphoric group	Control group	Cohen's d	Gender dysphoric group	Control group	Cohen's d
Natal females	32.24 <sup>2</sup> (13.81)	45.59 <sup>1</sup> (16.21)	.89	38.10 (13.08)	33.30 <sup>4</sup> (14.35)	.35
Natal males	28.43 <sup>3</sup> (16.40)	38.90 (17.10)	.62	37.46 (15.76)	41.93 <sup>*</sup> (14.95)	.29

- <sup>1</sup> Typical females have marginally higher EQ than typical males ( $p = 0.056$ ).
- <sup>2</sup> Female-to-male adolescents with gender dysphoria have lower EQ than female controls ( $p < 0.01$ ).
- <sup>3</sup> Male-to-female adolescents with gender dysphoria have lower EQ than the female controls ( $p < 0.01$ ).
- <sup>4</sup> Typical males have higher SQ than typical females ( $p < 0.01$ ).
- \* Effect size (using Cohen's d) between .2 and .4 is considered to be small. A value between .5 and .7 is considered a medium effect size and a value greater than .8 is considered a large effect size (Cohen 1988).

**Table 1:** Means (and standard deviations) on EQ and SQ in participants in the transgender or typical control group.

**Psychological dimension systemising**

A between-group ANOVA was run with systemising as the dependent variable and group (control or gender dysphoric) and natal gender (female or male) as independent variables. There was a significant main effect of gender ( $F(1,174) = 9.97, p < 0.001$ ), indicating that the means on the SQ were significantly different for natal females and natal males. However, the main effect of group was non-significant, indicating that the mean SQ score was not significantly different in the control and gender dysphoric groups ( $F(1,174) = 2.66, p = 0.10$ ). Nor was there a significant interaction between group and gender ( $F(1,174) = 2.66, p = 0.10$ ). There were 13 systemising questionnaires missing in the control group, which may have affected the results.

**Psychological dimension systemising: post hoc tests**

Tukey's (HSD) pairwise multiple comparisons showed that the mean SQ score was not significantly higher for the female-to-male gender dysphoric group than female controls ( $p = 0.54$ ). There was also no significant difference on the SQ for the female-to-male

gender dysphoric group and the male controls ( $p = 0.72$ ). For the male-to-female gender dysphoric group there was no significant difference in the SQ scores compared to male controls ( $p = 0.74$ ). There was no significant difference on SQ for the male-to-female gender dysphoric group and the female controls ( $p = 0.78$ ) and no significant difference on SQ for natal males and natal females in the gender dysphoric group ( $p = 0.99$ ). However, the mean SQ was significantly higher for males than females in the control group, as expected ( $p < 0.01$ ) (see **Table 1**).

**Discussion**

The present study found that female-to-male adolescents with gender dysphoria have, on average, significantly lower EQ scores compared to typical female controls. The lower EQ scores in the female-to-male transgender adolescents are in line with our earlier study (Jones et al. 2011) showing that adult female-to-male transsexual people (transmen) have a higher mean Autism Spectrum Quotient (AQ) than typical females, since the AQ includes items related to empathy. Empathising in the male-to-female transgender gender dysphoric group was on average



lower than in the male controls, although this difference did not reach significance following Tukey's (HSD) correction for multiple comparisons. The mean SQ in the gender dysphoric groups did not differ significantly from the controls of the same natal gender. Overall, as low empathy is a component of ASC, our findings are in line with de Vries et al. (2010), who found an increased level of ASC in young people with GD.

Our study shows that a subgroup of adolescents with GD, particularly natal females, have lower empathy than controls. Female-to-male gender dysphoric adolescents seem to function, in terms of empathising, more like control males. Whether this similarity, together with other factors, contributes to their identification as males remains an open question. The male-to-female gender dysphoric group seems to show levels of empathy more similar to male controls than to female controls. One cannot say that their level of empathising could be a contributory factor to their female identification as the EQ score is significantly lower than that of female controls. This discrepancy indicates that there may be different pathways leading to atypical gender identity development or GD.

Whether or not empathy plays a particular role in atypical gender identity development, lower empathy may affect an individual's capacity for communicating and taking on board other people's views and feelings, and influences the quality of relationships with family members and peers. Moreover, for young people with gender dysphoria, lower empathy may affect the ability to consider, in depth, options for dealing with the incongruence between self-perception and body structure and/or functions. It may be helpful for adolescents with gender dysphoria with low empathy scores to be offered psychological interventions which improve their communication skills and their ability to take on board other people's views and perspectives. This would support their development and may enable them to make

informed decisions regarding treatment and physical intervention options during adolescence and beyond.

A potential limitation of this study was the risk of a bias in filling in the questionnaires as the participants (i.e. the parents) may have tried to guess what the expected answers should be in connection with gender stereotypes. However, there is no evidence for such a bias since, in that case, the adolescents with male-to-female gender dysphoria should have scored in the typical female range on the EQ. Secondly, in this study we took a dimensional rather than diagnostic approach. However, it would be interesting to also measure autistic traits (e.g., using the AQ-Adolescent Version, Baron-Cohen, Hoekstra, Knickmeyer & Wheelwright 2006). We suggest that this measure should be included in a future research project. Finally, the gender dysphoric group was relatively small ( $n = 35$ ) and this may have affected the results.

This study is a preliminary effort at quantitatively studying systemising and empathising in adolescents with GD. It will be important to replicate the study with a larger sample and using additional measures. Future research could also study the persistence and desistence of GD in the transition from childhood to adolescence and the possible link between our findings and the three factors described by Steensma, Biemond, de Boer and Cohen-Kettenis (2011) as contributing to the persistence or desistence of GD. These factors include the changes in their social environment, the anticipated and actual feminisation or masculinisation of their bodies, and the first experiences of falling in love and sexual attraction. This area of research may also be relevant to conditions in which rigid cognition and behaviour, as represented by high levels of single mindedness is a central feature, such as anorexia nervosa (Baron-Cohen et al. 2013) and severe body dysmorphic conditions.

In summary, female-to-male transgender adolescents have, on average, lower empathy than female adolescent controls. In the

male-to-female transgender adolescents, empathy was not significantly lower than in male controls, but it was not as high as in female controls, as one might have expected given their female identity. No single cause has yet been found to explain the development of atypical gender identity. A number of biological and psychosocial factors interact during development to lead to atypical gender identity (Di Ceglie 2000). In some individuals, lower empathy levels, consistent with ASC, may be one of the factors in atypical gender identity development and its persistence from childhood to adolescence and beyond. This is an area worth exploring further. Moreover, the variable level of empathy in different individuals might also influence the variety of identity presentations in the transgender community.

The findings from this study are tentative given its preliminary nature, but indicate that further research with a larger group of gender dysphoric adolescents and additional measures such as the AQ would be useful.

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